



Patent
Attorney's Docket No. 032619-030

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Oliver LEGENDRE et al.) Group Art Unit: 1764
Application No.: 08/914,244) Examiner: W. Griffin
Filed: August 19, 1997) Appeal No.
For: CATALYTIC TREATMENT OF)
GASEOUS EFFLUENTS)
CONTAINING VARYING)
AMOUNTS OF SULFUR)
COMPOUNDS)

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REPLY BRIEF

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This reply addresses new issues raised by the Examiner in the Examiner's Answer mailed June 1, 2001.

Issue 1

In the rejection of Claims 1-3, 7 and 11-21 under 35 U.S.C. §102(b) over U.S. Patent No. 4,364,858 ("Goodboy"), the Examiner stated the following:

The Goodboy reference discloses a Claus catalyst in the form of activated alumina containing sodium oxide in an amount preferably between 0.1 and 2.5 wt% (1000 to 25000 ppm). This disclosed sodium oxide range of 1000 to 25000 ppm clearly anticipates the claimed ranges of 1200 to 2500 ppm, 1500 to 2500 ppm, 1200 to 2700 ppm, and 1700 to 2200 ppm sodium oxide. (Examiner's Answer at page 3, lines 5-9).

In the section entitled "Response to Argument" the Examiner took the following position:

The lack of examples that utilize sodium oxide contents within the claimed ranges does not negate the teaching of sodium oxide values that completely cover the claimed range. (Examiner's Answer at page 5, lines 14-16).

In view of the Examiner's reasoning in the "Response to Argument" it is clear that the rejection is based on overlapping ranges. Overlapping ranges, however, does not establish anticipation. MPEP § 2131.03 is entitled "Anticipation of Ranges" and includes a discussion of legal decisions wherein patentability of claimed ranges was at issue. The first cited case is *Titanium Metals Corp. V. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) wherein the court held the following:

It is also an elementary principle of patent law that when, as by a recitation of ranges or otherwise, a claim covers several compositions, the claim is "anticipated" if one of them is in the prior art. *In re Petering*, 301 F.2d 676, 682, 133 USPQ 275, 280 (CCPA 1962).

The second case is *In re Petering* cited in the *Titanium Metals* decision. The third case is *Ex parte Lee*, 31 USPQ2d 1105 (BPAI 1993) wherein the Board, sitting *en banc*, stated the following:

The polyolefin resin which is component (b) of appellant's claimed composition is limited as "having a melt index of less than about 5 grams/10 minutes." It is uncontroverted that, **except for the melt index value, essentially all of the compositions disclosed in the reference are within appellant's claim recitation.** With respect to the polyolefin resin, the reference discloses a "preferred" range of [melt index of 0.1 to 40].

In our view, the explicit disclosure of a composition based on a polyolefin resin having a melt index of 0.1 [footnote omitted] represents a specific disclosure of a **discrete embodiment of the invention disclosed by Lee which amounts to a complete description and, thus, an anticipation of appellant's claim 1.** It has long been held that the disclosure in the prior art of any value within a claimed range is an **anticipation of the claimed range.** See, merely for example, *In re Wertheim*, 541 F.2d 257, 267, 191 USPQ 90, 100 (CCPA 1976). We discern no reason for treating the specific value disclosed in the reference as the lower limit of a range any differently from any other single value disclosed in a reference. [footnote omitted]. Thus, on the record before us, we conclude that the reference, at least on its face, anticipates the invention claimed here. (Emphasis added)

There can be no doubt in the present case that Goodboy does not disclose any examples falling within the scope of the claims on appeal. Further, the 1000 ppm lower endpoint of Goodboy's range of sodium oxide does not fall within the claimed range. As a matter of law, the §102 rejection is in error and should be reversed.

New Issue 2

In the Examiner's Answer, it is stated that "[i]t is desirable for the catalyst [of Goodboy] to have a surface area greater than 300 m²/g [which] clearly anticipates applicant's claimed surface area" (Examiner's Answer at page 3, lines 9-10). The Examiner's position regarding the law of anticipation is in error. As explained above, all of the legal decisions cited in MPEP § 2131.03 require the prior art to disclose a specific example within a claimed range in order to be anticipatory. In the present case, Claims 16 - 22 recite that the activated alumina catalyst has a specific surface area of 350 to 370 m²/g whereas Goodboy discloses:

High surface area, i.e., surface area greater than 100 m²/g (BET), is desirable with a surface area greater than 300 m²/g (BET) being particularly beneficial. (column 3, lines 66-68 of Goodboy).

Goodboy does not disclose an activated alumina catalyst comprising a cocatalytically effective amount of sodium values for conversion of CS₂ wherein the effective amount is expressed by weight of Na₂O ranging from 1200 ppm to 2500 ppm, as recited in Claim 1, and having a specific surface area of 350 to 370 m²/g, as recited in Claim 16, which depends from Claim 1. Likewise, Goodboy does not disclose any examples or endpoints of ranges for the specific surface which meet the combinations of features recited in Claims 17 - 22. As such, the rejection is in error and should be reversed.

New Issue 3

In the "Response to Argument" section of the Examiner's Answer, the Examiner stated that:

... the evidence of unexpected results is irrelevant to overcoming the rejection. (Examiner's Answer at page 5, lines 16-17).

As explained above, the §102 rejection is contrary to well established legal precedent. Although the Examiner did not reject Claims 1 -3, 7 and 11 - 21 under 35 USC §103(a), Appellant's showing of unexpected results clearly rebuts any *prima facie* case of obviousness presented by Goodboy. Overlapping ranges presents a §103 issue rather than a §102 issue. That is, according to MPEP §2131.03:

"If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, dependent on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with 'sufficient specificity' to constitute anticipation of the claims." (Emphasis Added)

In the present case, the Goodboy reference discloses a broad range of 0.1 to 2.5 wt. % sodium oxide and a preferred range of 0.50 to 2.5 wt. % (column 3, lines 57-60 of Goodboy). Applicants, on the other hand, claim a range of 1200 to 2500 ppm (0.12 to 0.25 %), i.e. a narrow range within Goodboy's broad range, and Applicants have submitted a showing of unexpected improvement in conversion of CS₂ over the claimed narrow range (see previously submitted Nedez Declaration). The claimed narrow range and the evidence of unexpected results, meets the conditions set forth in MPEP §2131.03 for overcoming an anticipation rejection over a reference disclosing a broader range. The Examiner's Answer does not provide any reasons why the conditions set forth in MPEP §2131.03 have not been met.

There is well established legal precedent that overlapping ranges only presents a *prima facie* case of obviousness under 35 USC §103, not anticipation under 35 USC §102. As explained in Appellant's Brief, to the extent the discussion in MPEP §2131.03 of Ex parte Lee, 31 USPQ2d 1105 (BPAI 1993) suggests that overlapping ranges per se establishes anticipation, any such per se rule would be in conflict with a long line of CCPA and CAFC cases.

In In re Baird, 29 USPQ 2d 1550 (Fed. Cir. 1994), the court stated that “[t]he fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious.” Also, evidence of unexpectedly good results can overcome a rejection based on optimization of a “result effective variable” provided the unexpected results are established by factual evidence. In re DeBlauwe, 222 USPQ 191, at 196 (Fed. Cir. 1994). With respect to optimization, in In re Antonie, 195 USPQ 6, 8 (CCPA 1977), the court stated that:

The PTO and the minority appear to argue that it will always be obvious for one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system even if there is no evidence in the record that the prior art recognized that particular parameter effected the result. As we have said many times, obvious to try is not the standard of 35 U.S.C. §103. (Emphasis in original.) Antonie, at 8.

The court in Antonie also stated that while the discovery of an optimum of a variable in a known process is normally obvious, there are two exceptions to the rule. The first exception is when the results of optimizing a variable, which was known to be result effective, were unexpectedly good. The second exception is in the case where the parameter optimized was not recognized to be a result-effective variable. In the present case, both exceptions apply since (1) the Nedez Declaration establishes unexpected improvement in CS₂ conversion over the claimed range and (2) Goodboy provides no recognition that low Na₂O contents would be effective in providing improved CS₂ conversion rates.

Goodboy states that increased sulfur conversion can be obtained using an activated alumina catalyst in which sodium oxide concentration, LOI (hydroxyl content determined by heating from 400° to 1100°C) and surface area are controlled (column 3, lines 17-21 and 31-32 of Goodboy). Goodboy discloses a broad range of 0.1 to 2.5 wt % sodium oxide but prefers 0.50 to 2.5 wt % on a 1000°C calcined basis (column 3, lines 57-60 of Goodboy). Goodboy teaches away from low sodium oxide contents at column 4, lines 18-35 wherein it is stated "low sodium oxide content was believed to be desirable...[but

contrary] to this expectation, significant amounts of sodium oxide are not only tolerable to a Claus catalyst, but, in fact, are beneficial . . ."

Goodboy's Examples 1-9 show a conversion rate of "S" of 79.1 to 82.9% for Na₂O contents of 0.44, 1.36, 0.43, 0.41, 0.09, 2.10, 0.10 and 0.33 wt % (1000°C Basis) according to Table I of Goodboy. Such results would be plotted as an essentially flat curve, the conversion rate of 0.09 and 0.10 wt % Na₂O being essentially the same as that of the 0.33 wt % and above Na₂O contents. Further, it is noted that Goodboy measured SO₂ chemisorption rather than conversion of CS₂.

It is well established that the unexpected discovery of improved results for a limited range within a broader range merits patent protection. See Baird, *supra*. In view of Goodboy's preference for Na₂O contents in amounts of 0.5% and above and Goodboy's data showing essentially the same conversion rate for Na₂O contents of 0.09 to 2.10%, the skilled artisan would not have expected low Na₂O contents to produce the dramatic improvement in CS₂ conversion discovered by Applicants. It is submitted that Appellants' showing of unexpected improvement in CS₂ conversion rates for the claimed range of 0.12 to 0.25% Na₂O rebuts any *prima facie* case of obviousness based on Goodboy.

The Nedez Declaration includes Attachment I wherein CS₂ conversion is plotted with respect to various Na₂O contents in a gas-catalyst prepared according to the process set forth in paragraph 2 of the Nedez Declaration. Attachment I shows the interpolated data corresponding CS₂ conversion rate for the closest Na₂O examples of Goodboy compared to the claimed 1,200 to 2,500 ppm Na₂O range (see paragraph 7 of the Nedez Declaration). Attachment I shows that the claimed 1,200 to 2,500 ppm Na₂O content provides new and unexpected results with respect to CS₂ conversion compared to Na₂O contents above and below the claimed range.

In the final Official Action, the only discussion of the Nedez Declaration is as follows:

"The argument that the Goodboy reference does not disclose applicant's claimed range of 1200 to 2500 ppm of sodium oxide with sufficient specificity to constitute anticipation is not persuasive because Goodboy's range of 0.1 to 2.5 wt% of sodium oxide is a preferred range. Since it is a preferred range, the examiner maintains that

one having ordinary skill in the art would be directed by the disclosure of Goodboy to use amounts within the preferred disclosed range. Therefore, the evidence of unexpected results is irrelevant to overcoming the rejection." (Emphasis Added, Official Action at page 6).

The Official Action misreads Goodboy and totally ignores Applicants arguments set forth in the response filed June 26, 2000. As explained repeatedly throughout prosecution of the present application, Goodboy's preferred range is 0.50 to 2.5 wt % (5000 to 25000 ppm), the lower limit of the preferred range being two times greater than the upper end of Applicants' claimed range. Goodboy's lower end of the broad range of 0.1 to 2.5 wt % is lower than the lower end of the claimed range. Applicants claim a narrow range within the broad range of Goodboy and Applicants' evidence of unexpected results establishes patentability of the claimed narrow range.

The position taken in the Official Action that the submitted evidence is "irrelevant" is clearly improper since MPEP §716.01 states that:

"[a]ll entered affidavits, declarations, and other evidence traversing rejections [must be] acknowledged and commented upon by the examiner in the next succeeding action [and] the examiner must specifically explain why the evidence is insufficient" (page 700-151).

In the present case, the Examiner's Answer dismisses the Nedez Declaration as "irrelevant" and no comments are provided as to the reasons why the Examiner considers the comparative data insufficient at least with respect to the §103 rejections. Applicants have shown unexpectedly improved results for the narrow range of sodium oxide values according to the claimed invention. The Examiner has not commented on the sufficiency of the showing of unexpected results set forth in the Nedez Declaration. In view of the Examiner's failure to comment on the probative value of the comparative data, it is submitted that the Nedez Declaration adequately rebuts any *prima facie* case of obviousness based on the combination of Goodboy and Dupin.

As set forth in MPEP § 716.02(e) "Comparison With Closest Prior Art," it is necessary to compare the claimed subject matter with the closest prior art to be effective to rebut a *prima facie* case of obviousness. In the present case, an examination of Exhibit I of

the Nedez Declaration shows that the improvement of CS₂ conversion occurs over the entire claimed range and that the closest examples of Goodboy (900 ppm, 1000 ppm and 3300 ppm) do not achieve the unexpected improvement in CS₂ conversion achieved by Na₂O contents within the claimed range. The Examiner has not commented on the sufficiency of the showing of unexpected results set forth in the Nedez Declaration. In view of the Examiner's failure to comment on the comparative data, it is submitted that the Nedez Declaration adequately rebuts any *prima facie* case of obviousness based on the combination of Goodboy and Dupin.¹

As set forth in MPEP § 716.02 "Allegations Of Unexpected Results," it is necessary to determine whether the properties differ to such an extent that the difference is really unexpected. This portion of the MPEP cites In re Waymouth, 499 F.2d 1273, 182 USPQ 290, 293 (CCPA 1974) for the following test:

"... unexpected results for a claimed range as compared with the range disclosed in the prior art had been shown by a demonstration of a 'marked improvement, over the results achieved under other ratios, as to be classified as a difference in kind, rather than one of degree.'"

A review of Exhibit I of the Nedez Declaration reveals that the CS₂ conversion drops off dramatically at values above 2700 ppm Na₂O and below 1200 ppm Na₂O. Such results are truly unexpected in view of Goodboy's preference for Na₂O contents above 0.50 % (5000 ppm) in order to reduce SO₂ chemisorption upon the catalyst (see column 3, line 54 through column 4, line 6 of Goodboy). Goodboy discloses that "[i]n order to achieve low SO₂ chemisorption . . . high sodium oxide content [is] beneficial" (see column 4, lines 18-22 of Goodboy). Accordingly, while Goodboy discloses an overlapping range of Na₂O,

¹ In a prior Official Action it was stated that "[a] skilled artisan would recognize that the amount of sodium oxide required for optimum results would differ for each of said recited compounds" and that depending on the process for which the catalyst is to be employed, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have determined the optimum concentration of sodium oxide because sodium oxide is a recognized result-effective parameter" (Official Action dated May 27, 1999 at pages 6-7). The final Official Action abandons this prior position in favor of the untenable anticipation theory.

Goodboy teaches away from the claimed range which Appellants have shown produces unexpected improvement in CS₂ conversion, a result not mentioned in Goodboy. The Examiner has not commented on the showing of unexpected results set forth in the Nedez Declaration. In view of the Examiner's failure to comment on the comparative data, it is submitted that the Nedez Declaration adequately rebuts any *prima facie* case of obviousness based on the combination of Goodboy and Dupin.

For the reasons set forth in Appellant's Brief and the additional reasons set forth above in this reply Brief, it is submitted that the § 102 rejection is improper because Goodboy does not disclose a single example falling within the claimed range of sodium oxide values and any *prima facie* case of obviousness based on Goodboy alone or based on the combination of Goodboy and Dupin or Goodboy and Flytzani-Stephanopolous is overcome by the showing of unexpected results set forth in the Nedez Declaration, i.e., the claimed Na₂O range produces unexpected improvement in CS₂ conversion in comparison to the closest examples (interpolated using Attachment I of the Nedez Declaration) of Goodboy. Accordingly, reversal of the three grounds of rejection set forth in the final Official Action is respectfully requested.

Respectfully submitted,

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